

Work Order ID 110109

110109

Page 1

December-17-13 9:15:13 AM

Item ID: D350-748-201

Accept

N900040100

Setup Start *NS1*

Revision ID:

Stop *NS2*

Item Name: Aft Crosstube

Start Date: 12/17/13 Start Qty: 1.00 *1*

Cust Item ID:

Required Date: 12/17/13 Req'd Qty: 1.00 *1*

Customer:

Reference:

Approvals: Process Plan: MLJ Date: 13-12-19 Tooling: _____ Date: _____

Run Start *NR1*

QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Stop *NR2*

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
Draw Nbr	Revision Nbr								
D350-748-241	G								

100
100
DC
Document Control

DOCUMENT CONTROL

Memo
Photocopy bluefile & type labels per PPPD350-748-201

0.00
0.00

DAS
06
9-89

CHG003

MAY 16 2014

MLJ

110
110
CNC Bend 2
CNC Alpha 160 Bender

BENDING MACHINE - CROSSTUBES

Memo
Bend tube as per Dwg D350-748-241 using CNC bender program D350A and Folio FT
*****UNDER BEND .225" PER SIDE*****
****USE (4) DT9824 SHIM BLOC TO CHECK STRAIGHTNESS****

0.00
0.00

JW

14-03-19

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Page 2

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Customer:

Reference:

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____

Run Start ***NR1***

QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Stop ***NR2***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
--------------------------------	--------------------------	----------------------	---------	--------	--------------	---------------	---------------	------------------	----------------

120 QC6- Inspect dimensions to drawing 0.00

120

QC

Quality Control

Memo

0.00

USE (4) DT9824 SHIM BLOC TO CHECK STRAIGHTNESS

125 0.00

125

Outsource1

Outsource process - Heat Treat

Memo

0.00

ISSUE P/O TO METCOR: 23427

Stress relief

Heat treat crosstube as per QSI010 4.3 within 12h after bending

CL 14/03/19 ①

126 Receive & Inspect for Damage & Mat'l Certs 0.00

126

Packaging

Packaging

Memo

0.00

1x SP 14-3-21

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Item ID: D350-748-201

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Setup Start ***NS1***

Revision ID:

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Cust Item ID:

Required Date: 12/17/13 Req'd Qty: 1.00 ***1***

Customer:

Reference:

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____

Run Start ***NR1***

QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Stop ***NR2***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
--------------------------------	--------------------------	----------------------	---------	--------	--------------	---------------	---------------	------------------	----------------

127 QC15- Crosstube Dimensional Check 0.00

127

QC

Quality Control

Memo

MARK CUT LINES

0.00

DAS
03
8-89

[Signature]

14-3-25

128

0.00

128

Crosstubes

Crosstubes

Memo

CUT TUBE AT HEIGHT ON FAI SHEET

VERF HEIGHT 31.6 BY QC 15 LEVEL INSPECTOR

VERF TWIST 0.340 BY QC15 LEVEL INSPECTOR

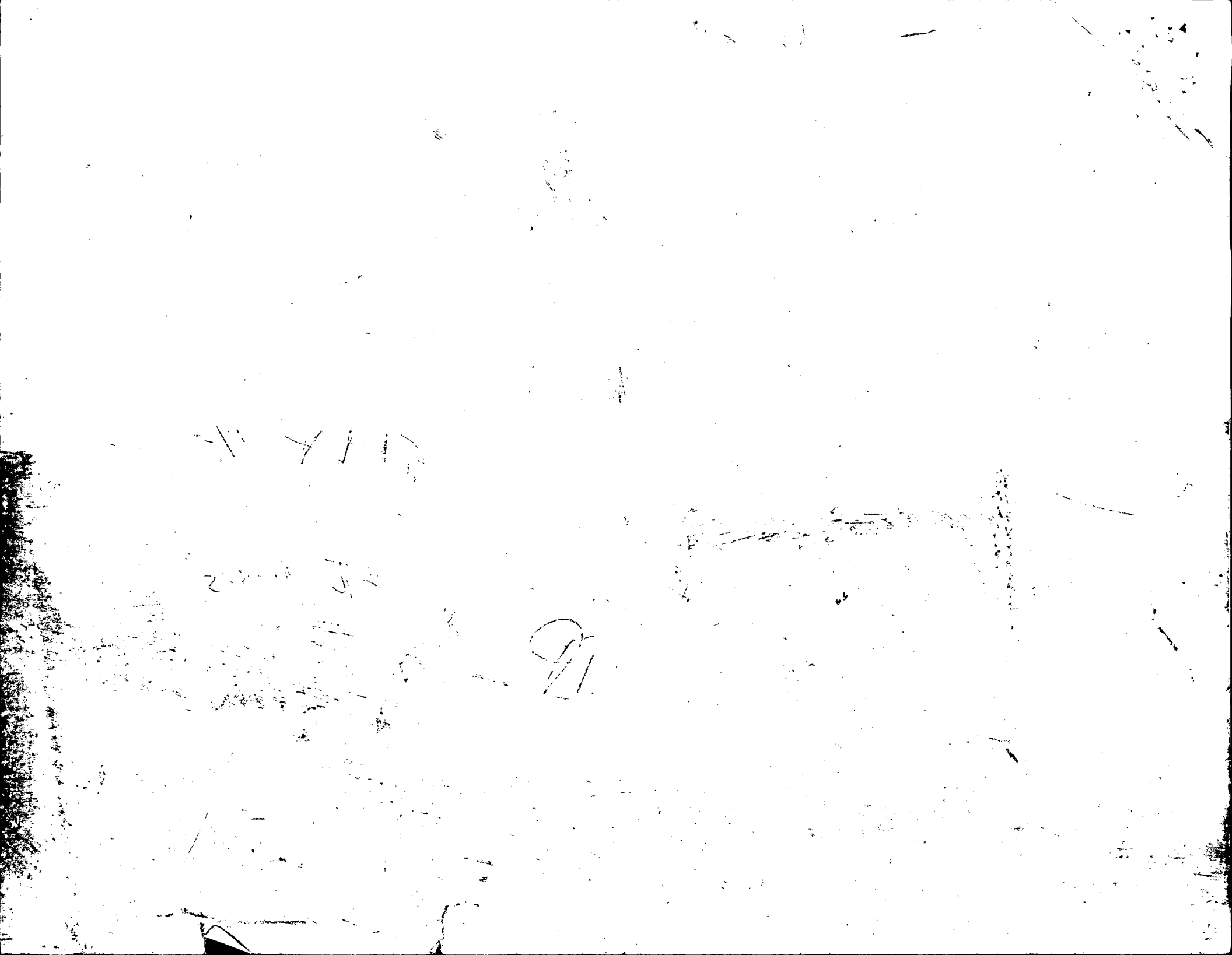
0.00

[Signature]

DAS
03
8-89

[Signature]

14-03-25



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Item ID: D350-748-201

Accept

N900040100

Setup Start

NS1

Revision ID:

Stop

NS2

Item Name: Aft Crosstube

Start Date: 12/17/13 Start Qty: 1.00

1

Cust Item ID:

Required Date: 12/17/13 Req'd Qty: 1.00

1

Customer:

Reference:

Approvals:

Process Plan: _____

Date: _____

Tooling: _____

Date: _____

Run Start

NR1

QC: _____

Date: _____

SPC (Y/N): _____

Date: _____

Stop

NR2Sequence ID/
Work Center IDOperation
DescriptionSet Up/
Run Hours

Tool ID

Tool #

Plan
CodeAccept
QtyReject
QtyReject
NumberInsp.
Stamp

130

0.00

130

Crosstubes

Crosstubes

Memo

0.00

2- Drill Tube as per Dwg D350-748-241 Using DT8876 Drill Jigs,
Set-up drill table as per QSI 010

3 -Deburr

4- Engrave Part # and Batch # as per Dwg D350-748-241

5-Remove all marks from tube within limits of D350-748-241

JTW 14-03-27

JTW 14-04-01

140

0.00

140

QC

Quality Control

QC6- Inspect dimensions to drawing

Memo

0.00

DAS

27

9-89

14/4/12

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N900040100

Setup Start *NS1*

Stop *NS2*

Start Date: 12/17/13 **Start Qty:** 1.00 ***1***

Cust Item ID:

Required Date: 12/17/13 **Req'd Qty:** 1.00 ***1***

Customer:

Reference:

Approvals: **Process Plan:** **Date:** **Tooling:** **Date:**

Run Start *NR1*

QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Stop *NR2*

**Insp.
Stamp**

0.00

150

Outsource3

Memo

0.00

Outsource process - Cad plate

Issue P/O: 23591
Stress relief at 375° for 5 hours
Magnetic Particle Inspect per ASTM E1444
Cadium Plate per AMS-QQ-P-416B, Class 1, Type 2
Embrittle relief at 375° for 8 hours, Chromate Treat
Possible Supplier: Southwest United Industries
Ensure Certificate of Conformity is attached

160

Receive & Inspect for Damage & Mat'l Certs	0.00
--	------

160

Packaging

Memo

0,00

Packaging

Ensure certificate of conformity is attached

170

QC5- Inspect part completeness to step on W/O	0.00
---	------

170

QC

Memo

0.00

Quality Control

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Item ID: D350-748-201

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Start Date: 12/17/13 Start Qty: 1.00 *1*

Cust Item ID:

Required Date: 12/17/13 Req'd Qty: 1.00 *1*

Customer:

Reference:

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____

Run Start *NR1*

QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Stop *NR2*

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
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174	Outsource process - NDT per QSI038 4.1	0.00							
174									
Outsource2	Memo	0.00							
Outsource process - NDT	ISSUE P/O TO ACCUREN: <u>24178</u>								

CZ 14/05/12 ①

176	Receive & Inspect for Damage & Mat'l Certs	0.00							
176									
Packaging	Memo	0.00							
Packaging									

14/05/12 ①

178	QC5- Inspect part completeness to step on W/O	0.00							
178									
QC	Memo	0.00							
Quality Control									

DAS
27
9.89
14/5/12

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Item ID: D350-748-201

Accept

N900040100

Setup Start *NS1*

Revision ID:

Stop *NS2*

Item Name: Aft Crosstube

Start Date: 12/17/13 Start Qty: 1.00 *1*

Cust Item ID:

Required Date: 12/17/13 Req'd Qty: 1.00 *1*

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Reference:

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____

Run Start *NR1*

QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Stop *NR2*

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
--------------------------------	--------------------------	----------------------	---------	--------	--------------	---------------	---------------	------------------	----------------

180

0.00

180

SprayPaint

SprayPaint

Memo

0.00

Spray Painting

1-Prime inside crosstube as per QSI 005 4.2

BATCH: 128 826

2-Paint Outside of Tube as per Dart QSI 005 4.2

BATCH: 128 826

Spray paint White Imron B: m/128840

190

0.00

190

QC14- Inspect Spray Paint

QC

Memo

0.00

Quality Control

Then, Wrap in plastic bag to protect from scratches

start: 3:00

finish: 4:00

DAS

27

4-89

W/S/12

CR 14-05-12

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Item ID: D350-748-201

Accept

N900040100

Setup Start *NS1*

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Item Name: Aft Crosstube

Start Date: 12/17/13 Start Qty: 1.00 *1*

Cust Item ID:

Required Date: 12/17/13 Req'd Qty: 1.00 *1*

Customer:

Reference:

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____

Run Start *NR1*

QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Stop *NR2*

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
200	Crosstubes	0.00							
200									
Crosstubes	Memo	0.00							
Crosstubes	INSTALL GROUND WIRE INSERT, THEN INSERT SCREW AND WASHER								
	1-Abrade mating surfaces of support and crosstube with 180 grit sandpaper, clean the area with MEK or equivalent as per dwg								
	2-Install supports with Proseal 890 per D350-748-241 and QSI 015								
	A/R Proseal 890 Batch: 128712								
	EXP: 10/14								
	3-Install supports clamps Using Dt8876 as per Dwg D350-748-241, Torque to 60-80 IN-LBS.								
	PROSEAL CURE TIME 72 HOURS:								
	Start: 14-5-13								
	Finish: 14-5-16								
210	QC5- Inspect part completeness to step on W/O	0.00							
210									
QC	Memo	0.00							
Quality Control	***RE-CHECK TORCQUE ON CLAMP AFTER PROSEAL HAS CURED FOR 72HOURS AS PER DWG.***								

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Item ID: D350-748-201

Accept

N900040100Setup Start ***NS1***

Revision ID:

Stop ***NS2***

Item Name: Aft Crosstube

Start Date: 12/17/13 Start Qty: 1.00 ***1***

Cust Item ID:

Required Date: 12/17/13 Req'd Qty: 1.00 ***1***

Customer:

Reference:

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____

Run Start ***NR1***

QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Stop ***NR2***Sequence ID/
Work Center IDOperation
DescriptionSet Up/
Run Hours

Tool ID

Tool #

Plan
CodeAccept
QtyReject
QtyReject
NumberInsp.
Stamp

250

QC21- Final Inspection - Work Order Release

0.00

250

QC

Memo

0.00

Quality Control

14/5/16

14-5-16

Picklist Print

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Page 1

Work Order ID: 110109
Parent Item: D350-748-201
Parent Item Name: Aft Crosstube

Start Date: 12/17/13
Start Qty: 1.00

Required Date: 12/17/13
Required Qty: 1.00

Comments: IPP Rev: A New Issue 06-07-05 JLM
IPP Rev: B Update qty of MS21042L5 06-09-12 KJ
IPP Rev C Combined manufacturing 08.04.02 EC verified by: DD
IPP Rev:D 08-06-24 revD as per dwg DD verified by:EC
IPP Rev: E 08.12.11 Step17 was step 21 KJ Verified by:EC IPP Rev:F 10.08.04 added QSI010
4.3 DD verf:EC IPP REV:G ADD UNDER BEND COMMENT 12-05-28 JLM IPP
REV:H 12.11.05 as per dwg D350-748-141G DD verf:JLM

Component Item ID/ Item Name	Replacement Item ID	Mfg/ Purch	Bin Item	Primary Location	Last Location	Route Seq ID	Unit of Measure	Qty on Hand	Qty per Kit	Total Qty	Qty Issued	Date Issued	Status
ALS4-1032-225 Rivnut		Purchased	No			200	Each	848.0000	1	1		14-5-13	
				<u>Location</u>		<u>Loc Qty</u>	<u>Loc Code</u>						
				FG		30							
				M127028		30							
				ST280		129							
				M125954		20							
				M127028		109							
				st555		689							
				M127092		689							
AN4-41A Bolt		Purchased	No			220	Each	674.0000	8	8		14-5-16	
				<u>Location</u>		<u>Loc Qty</u>	<u>Loc Code</u>						
				ST359		1							
				123346		1							
				ST515		2							
				121185		2							
				ST517		671							
				124241		171							
				124805		315							
				124836		185							

DAS
06
9-89

DAS
26
9-89

DAS
28
9-89

Picklist Print

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Page 2

Work Order ID: 110109

Parent Item: D350-748-201

Parent Item Name: Aft Crosstube

Start Date: 12/17/13

Required Date: 12/17/13

Start Qty: 1.00

Required Qty: 1.00

AN4-6A
BOLT

Purchased No

220 Each 1,235.0000

16 m128634 DAS
26
9-89

DAS
06
9-89

Location	Loc Qty	Loc Code
ST355	282	
123355	30	
M126175	2	
M127410	250	
ST514	953	
M126317	953	

DAS
28
9-89

AN5-32A
Bolt

Purchased No

220 Each 267.0000

4 m128403 DAS
26
9-89

DAS
06
9-89

Location	Loc Qty	Loc Code
st503	267	
124215	218	
124805	5	
m127363	14	
m127550	30	

DAS
28
9-89

D3500-1
Saddle

Manufactured No

220 Each 97.0000

4 14-5-16

DAS
06
9-89

Location	Loc Qty	Loc Code
ST428A	12	
95810	12	
ST430A	66	
108799	40	
91888	8	
94620	18	
ST431	19	
95381	19	

DAS
28
9-89

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Shop Packet Print

Page 2

Picklist Print

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Page 3

Work Order ID: 110109
 Parent Item: D350-748-201
 Parent Item Name: Aft Crosstube

Start Date: 12/17/13

Required Date: 12/17/13

Start Qty: 1.00

Required Qty: 1.00

D3501-1
 Bushing

Manufactured No

220 Each 485.0000

16

16 14-5-16

M/15846

DAS
 28
 9-89

DAS
 06
 9-89

Location	Loc Qty	Loc Code
ST043	160	
86913	160	
ST051	2	
103038	2	
ST052	323	
104369	80	
105395	90	
105576	40	
88532	1	
95165	112	

DAS
 28
 9-89

D3502-1
 Support

Manufactured No

200 Each 79.0000

2

2

14-5-14

16

Location	Loc Qty	Loc Code
LG050	79	
104334	6	
73419	3	
74873	1	
86876	1	
88465	24	
94722	20	
97212	12	
99764	12	

Picklist Print

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Work Order ID: 110109
Parent Item: D350-748-201
Parent Item Name: Aft Crosstube

Start Date: 12/17/13

Required Date: 12/17/13

Start Qty: 1.00

Required Qty: 1.00

D350-748-241TRN
Crosstube Turning Detail

Manufactured No

B109696

110 Each 10.0000

1

1

Location

Loc Qty

Loc Code

LG014

10

103241

1

105672

1

105674

1

105675

1

105677

1

79392

1

86988

1

89962

1

97874

1

97879

1

JW 14-03-19

D3595-063-395
Rubber Cushion

Manufactured No

112363

200 Each 130.0000

2

2

AJ 14-5-14

Location

Loc Qty

Loc Code

FG

5

87353

5

LG051

125

100373

7

102441

6

102890

3

105542

14

108010

36

109481

20

87353

17

94602

1

97526

17

98361

4

2

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Shop Packet Print

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Work Order ID: 110109
 Parent Item: D350-748-201
 Parent Item Name: Aft Crosstube

Start Date: 12/17/13
 Start Qty: 1.00

Required Date: 12/17/13
 Required Qty: 1.00

MS21042L4
 Locknut

Purchased No

220 Each 4,214.0000

24

24

m128300.

DAS
 06
 9-89

Location	Loc Qty	Loc Code
FP001	38	
122452	38	
GA	30	
m126333	30	
ST314	9	
m125708	9	
st507	33	
m126073	33	
ST509	2008	
m126275	114	
m127255	1894	
ST510a	85	
m126333	85	
ST518	2011	
124231	154	
m127376	1857	

DAS
 26
 9-89

DAS
 28
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MS21042L5
 Nut

Purchased No

220 Each 840.0000

24

4

14-5-16

m128810

DAS
 06
 1-89

Location	Loc Qty	Loc Code
GA	5	
117611	5	
ST314	335	
125535	335	
ST509	500	
m127304	500	

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DAS
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Work Order ID: 110109

Parent Item: D350-748-201

Parent Item Name: Aft Crosstube

Start Date: 12/17/13

Required Date: 12/17/13

Start Qty: 1.00

Required Qty: 1.00

MS21920-22

Purchased

No

200

Each

103.0000

2

2

Clamp

Location 128199

Loc Qty

Loc Code

LG050

103

125487

5

M126420

4

M126637

4

M127255

40

M127608

50

④ → 2 scrap

AS 14-5-14

MS27039-1-10

Purchased

No

200

Each

382.0000

1

1

SCREW

Location 127993

Loc Qty

Loc Code

GA

100

120449

100

ST305

26

122815

1

123522

18

125654

7

ST506

256

124326

10

m126474

246

①

AS 14-5-13

NAS1149D0363J

Purchased

No

200

Each

4,179.0000

1

1

Washer

Location 128429

Loc Qty

Loc Code

GA

89

124392

89

ST294

11

113068

11

ST510a

4079

m126319

4079

①

AS 14-5-13

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Work Order ID: 110109
 Parent Item: D350-748-201
 Parent Item Name: Aft Crosstube

Start Date: 12/17/13 Required Date: 12/17/13
 Start Qty: 1.00 Required Qty: 1.00

NAS1149D0463J
 WASHER

Purchased No

220 Each 5,122.0000 32

(32) m128591 DAS
 26
 9-89

DAS
 06
 9-89

Location	Loc Qty	Loc Code
ST294	143	
119097	1	
121912	24	
124198	35	
124778	83	
ST510a	4979	
M126221	22	
M127693	4957	

DAS
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NAS1149D0563J
 Washer

Purchased No

220 Each 4,123.0000 8 8

14-5-16

Location	Loc Qty	Loc Code
GA	35	
m125807	35	
ST294	145	
122452	91	
123248	42	
123355	12	
ST510a	3943	
m126319	3943	

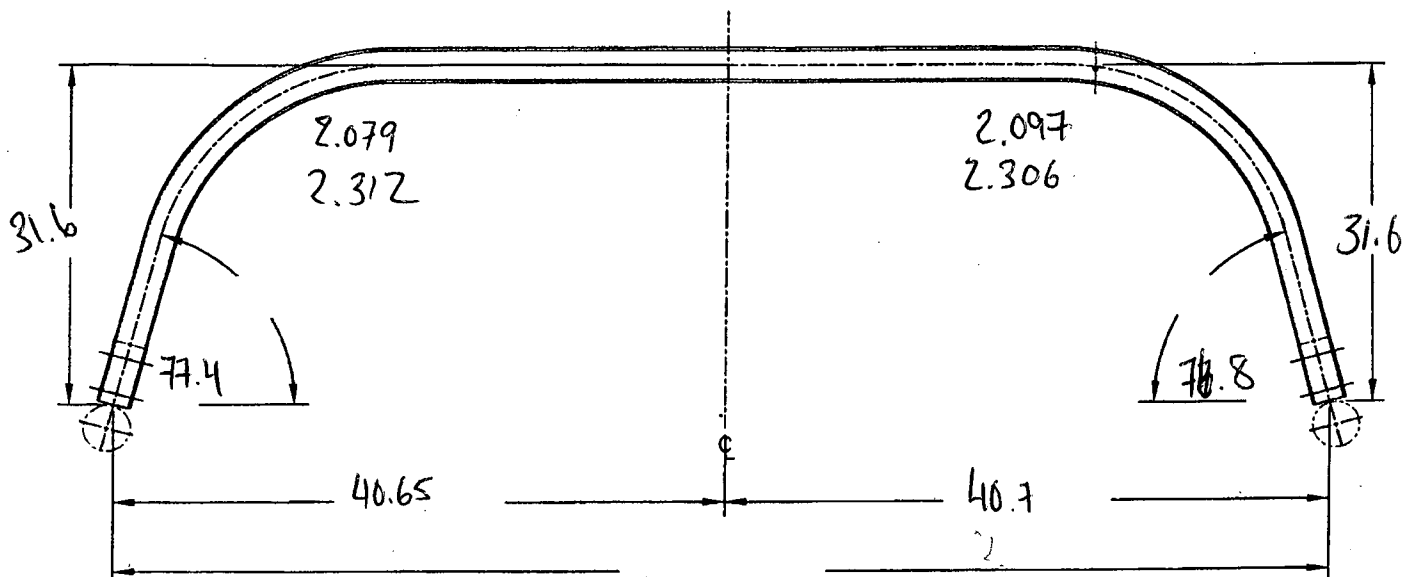
DAS
 28
 9-89

DAS
 06
 9-89

DAS
 26
 9-89

DART AEROSPACE LTD		Work Order:	110109
Description: Crosstube High Aft (AS350/355)		Part Number:	D350-748-201
Inspection Dwg: D350-748-241 Rev: G		Page 1 of 1	

Required Dimension	Min	Max
Height	31.22	31.48 31.6
1/2 Span	40.77	41.03
Angle	75	77
Total Span	81.54	82.06
Bending Passes	7	--
Crushing	--	6% 7%
Twist	--	0.25



	Side A	Side B
Bending Passes	38	39
Crushing	5.3%	4.7%
Comments		

QC15 Inspection	<i>[Signature]</i>
Date	14-3-25

Rev	Date	Change	Revised by	Approved
A	07.02.06	New Issue	KJ/JM	
B	10.08.23	Dwg Rev updated	KJ	
C	12.04.16	Added bending, crushing & twist dimensions	KJ	
D	12.07.31	Dwg Rev updated	KJ	
E	13.02.27	Dwg Rev updated	KJ	<i>[Signature]</i>

Item	Qty -241	Part Number	Description
1	X	D350-748-241	CROSSTUBE ASSEMBLY (AS 350/355 HI AFT)
2	1	D6015-125	CROSSTUBE (OR D6018-125)
3	2	D3502-1	SUPPORT
4	2	D3595-063-395	RUBBER CUSHION
5	1	AELS-1032-225	INSERT
6	1	NAS1149D0363J	WASHER (OR AN960JD10)
7	2	MS21920-22 OR MS21920-21	CLAMP (PER DART SPEC. M-MS21920-21-22)
8	1	MS27039-1-10	SCREW
9	A/R	PROSEAL 890 B-2	SEALANT, AMS-S-8802 CLASS B-2

GENERAL NOTES:

- 1) MATERIAL: MANUFACTURED FROM D6015-125 OR D6018-125
FINISHED LENGTH AFTER TURNING = 124.70±0.06 (AFTER BENDING/TRIMMING = 122.70 REF)
- 2) FINISH: MAGNETIC PARTICLE INSPECT PER DART QSI 038 4.2
CADMIUM PLATE PER AMS-QQ-P-416B, CLASS 1, TYPE II
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
PAINT OUTSIDE PER DART QSI 005 4.2
- 3) TOLERANCE: PER DART QSI 018 UNLESS OTHERWISE NOTED.
WALL THICKNESS ECCENTRICITY PER DART QSI 038 7.2
MIN. ALLOWABLE WALL IS -0.020 FROM NOMINAL
- 4) UNITS: INCHES UNLESS OTHERWISE NOTED.
- 5) BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
- 6) IDENTIFICATION: DART PART NUMBER "D350-748-241" AND BATCH NUMBER ON INSIDE OF CUFF
PER DART QSI 044 6.4 (VIBRATING STYLUS)
- 7) WEIGHT: 29.85 lbs
- 8) PART IS SYMMETRIC ABOUT CENTERLINE, EXCEPT FOR Ø0.297 HOLE.
- 9) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE. WHEN DRILLING HOLES EXTREME CARE MUST BE TAKEN AND CAREFUL DEBURRING PERFORMED TO ENSURE A CLEAN HOLE WITH NO CRACKING/CHIPPING/GROOVES.

TURNING

- 10) BLEND OUT ALL EDGES FROM MACHINING LONGITUDINALLY, TRANSITION SHOULD BE SMOOTH. NOTE: ALL HOLES ARE DRILLED AFTER BENDING.
- 11) HEAT TREAT TO MIN. 180 KSI PER MIL-T-6736 OR AMS2759/1E AFTER TURNING. ACCEPTABLE TO VERIFY TENSILE STRENGTH BY HARDNESS TEST PER ASTM E18 TO 40-45 HRC.

BENDING

- 12) ALL DIMENSIONS FOR BENT TUBE ARE POST STRESS RELIEF
- 13) BEND PROGRESSIVELY WITH A MINIMUM OF 7 PASSES PER SIDE. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D. ON TOP HALF OF BEND, AND 7% ON BOTTOM HALF OF BEND.
- 14) MAX AMPLITUDE OF RIBBLING ALONG BENT PORTION OF THE TUBE IS 0.030 (ZN A1-3)
- 15) AFTER BENDING, STRESS RELIEVE TUBE AT 850°F ±0.25°F FOR A MINIMUM OF 2 HRS AND ALLOW TO COOL TO AMBIENT TEMPERATURE (REF AMS2759/1E).
- 16) MAX TWIST AFTER STRESS RELIEF: WITH XTUBE LAYED FLAT ON SURFACE, THE DIFFERENCE BETWEEN CUFF HEIGHTS FROM THE SURFACE MAY BE NO LARGER THAN 0.38 (ZN C1-3).

ASSEMBLY

- 17) TO INSTALL D3502-1 SUPPORT: ABRASE MATING SURFACE OF SUPPORT AND CROSSTUBE WITH 180-GRIT SANDPAPER AND REMOVE RESIDUE WITH MEK (OR EQUIVALENT). APPLY A 0.02" TO 0.05" THICK LAYER OF PROSEAL 890 CLASS B-2 (OR AMS-S-8802 CLASS B-2) SEALANT TO MATING SURFACE OF SUPPORT.
- 18) TORQUE CLAMPS 60 TO 80 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING. PRIOR TO PACKAGING, RE-CHECK TORQUE ON CLAMPS AFTER PROSEAL 890 SEALANT HAS CURED FOR 72 HOURS.

110109 MJS
13-12-19

RELEASED
2012-11-01

G	RMV ABRASION STRIP, SUPPORT NOW W/ PROSEAL & CUSHION, ADD STRESS RELIEF, LONGER CUFF, NOW TRIMD AFTER BEND, ADD WALL DIMS & UPDATE TOL.	CP	12.09.12
F	ADD HRC TEST OPTION (B8-1) PER PAR 09-040, ADD TWIST LIMIT (A8-1, C1-3), ADD D6015-125 OPTION (C8-1), STOCK DIM NOW MACHINED (D1-4)	CP	10.11.23
E	REVISE GENERAL NOTES; UPDATE TO CURRENT STANDARDS; RELOCATED FLAG #6 PER PAR 08-046 (ZN A8-3); ADD TOLERANCES (ZN C8-3, D2-3)	RF	09.09.30
D	MAG. PARTICLE AND CAD PLATE AS MFD.	CP	06.10.31
C	ADD CAD PLATING	CP	06.08.14
B	ADD D6018-125 & PRIME AND PAINT	CP	06.06.30
A	NEW ISSUE	CP	06.03.31
REV.	DESCRIPTION	BY	DATE
DESIGN			
DRAWN			
CHECKED	A.R.		
MFG. APPR.			
APPROVED			
DE APPR.			
DATE	12.09.12		
DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA DRAWING NO. D350-748-241 SHEET 1 OF 4 TITLE CROSSTUBE (AS 350/355 HI AFT) SCALE NTS COPYRIGHT © 2006 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.			

8 7 6 5 4 3 2 1

D

C

B

A

D

C

B

A

17 18
D3502-1 SUPPORT
MS21920-22 CLAMP (OR -21)
D3595-063-395 RUBBER CUSHION
2 PL. C

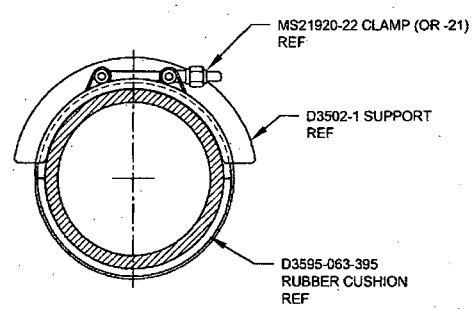
A7-2
A
A

14.37

D350-748-241
BENT TUBE

INSTALL THIS SIDE ONLY, AFTER FINISH:
AELS-1032-225 INSERT
NAS1149D0363J WASHER
MS27039-1-10 SCREW

**D350-748-241
ASSEMBLY DETAIL**

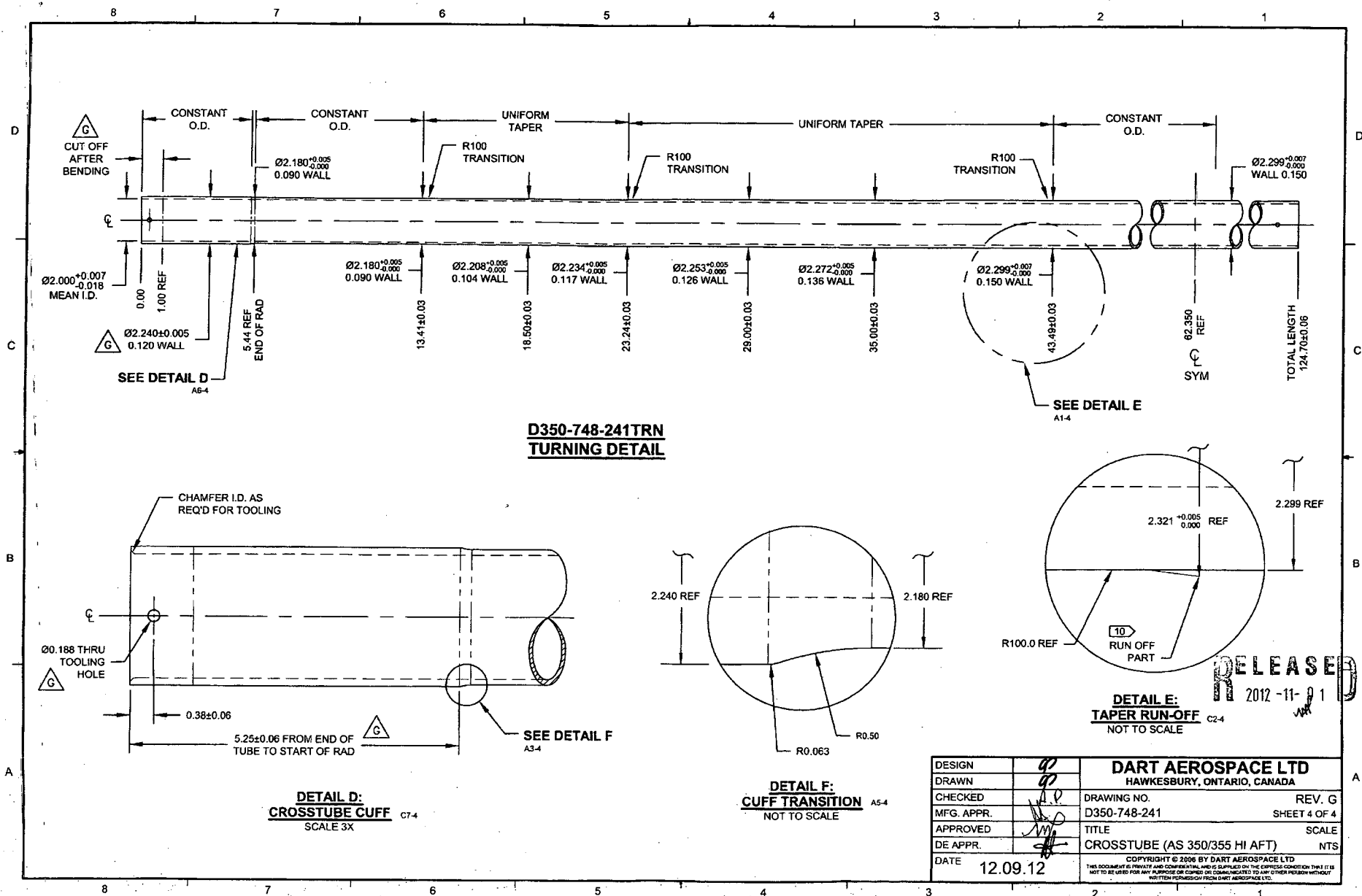


SECTION A-A D4-2
SCALE 6X

RELEASED
2012-11-01

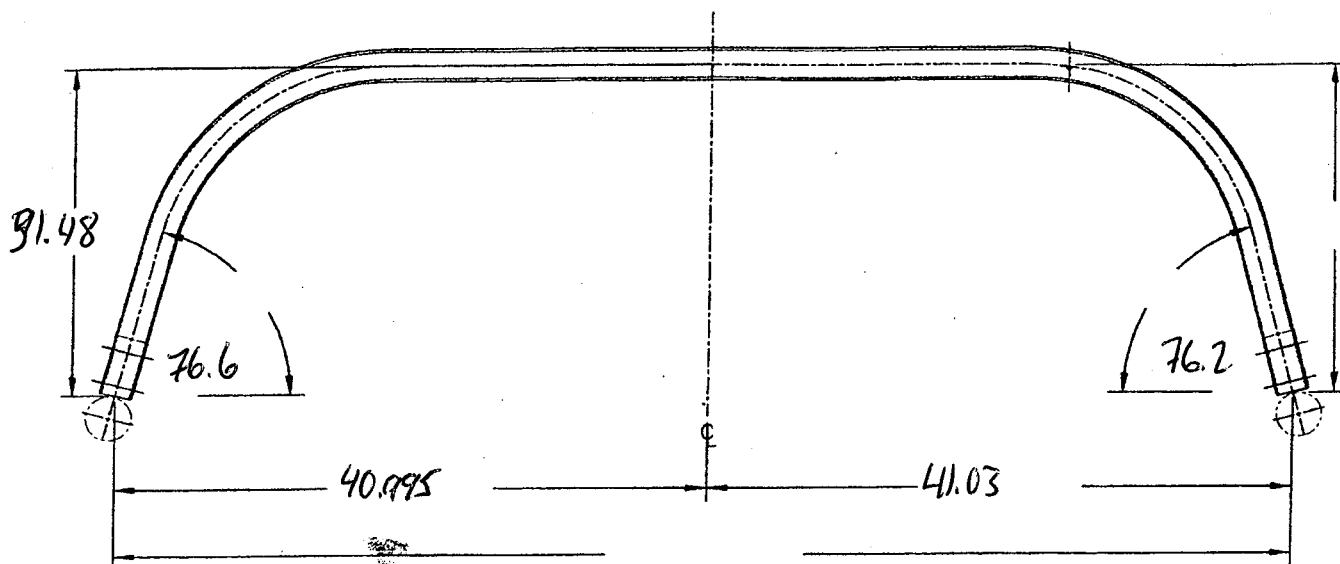
DESIGN	90	DART AEROSPACE LTD	
DRAWN	90	HAWKESBURY, ONTARIO, CANADA	
CHECKED	P. J.	DRAWING NO.	REV. G
MFG. APPR.	[Signature]	D350-748-241	SHEET 2 OF 4
APPROVED	[Signature]	TITLE	SCALE
DE APPR.	[Signature]	CROSSTUBE (AS 350/355 HI AFT)	NTS
DATE	12.09.12	<small>COPYRIGHT © 2006 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COPIED OR REPRODUCED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.</small>	

8 7 6 5 4 3 2 1



DART AEROSPACE LTD	Work Order: 110109
Description: Crosstube High Aft (AS350/355)	Part Number: D350-748-201
Inspection Dwg: D350-748-241 Rev: G	Page 1 of 1

Required Dimension	Min	Max
Height	31.22	31.48
1/2 Span	40.77	41.03
Angle	75	77
Total Span	81.54	82.06
Bending Passes	7	--
Crushing	--	7%
Twist	--	0.38



	Side A	Side B
Bending Passes		
Crushing		
Comments		
twist = 0.355		

QC15 Inspection	
Date	

Rev	Date	Change	Revised by	Approved
A	07.02.06	New Issue	KJ/JM	
B	10.08.23	Dwg Rev updated	KJ	
C	12.04.16	Added bending, crushing & twist dimensions	KJ	
D	12.07.31	Dwg Rev updated	KJ	
E	13.02.27	Dwg Rev updated	KJ	
F	14.02.13	Crushing & twist dimensions revised	KJ	

2000-0000

2000-0000

2000-0000

2000-0000

2000-0000

METCOR INC.

560 BOUL. ARTHUR-SAUVÉ, ST-EUSTACHE, QC, J7R 5A8

Tél.: 450-473-1884

Télécopieur / Fax administration: 450-491-5498

Télécopieur / Fax production: 450 491-6454

Certificat de Conformité Détaillé Detailed Certificate of Compliance

BON DE TRAVAIL order	CHARGEMENT load
194281	1

CLIENT / customer 215

DART AEROSPACE

1270 ABERDEEN

HAWKESBURY

ON K6A 1K7

LIVRÉ À / shipped to:

DART AEROSPACE

1270 ABERDEEN

HAWKESBURY

ON K6A 1K7

1

COMMANDE DU CLIENT customer po	BON DE LIVRAISON DU CLIENT customer shipper no.	MATÉRIEL material	CODE DE TRAITEMENT mat'l heat code	NUMÉRO DE LOT lot number
23427		Steel		
<u>SPÉCIFICATIONS DU PROCÉDÉ</u> processing specifications				
STRESS REL				
SAE AMS 2759/1 REV.E				
EXIGENCE / requirement SPÉCIFICATIONS / specified TESTS EXÉCUTÉS / performed RÉSULTATS DE TESTS / results				
Visual				
QUANTITÉ quantity	POIDS weight	DESCRIPTION DES PIÈCES parts description		
4	120	D350-748-101 ✓ CROSSTUBE (1) D350-748-101 CROSSTUBE 112354 (1) D350-748-201 / 110109 (1) D350-748-201 / 114192 (1) D350-748-201 / 114193 1 NIL		

COMMENTAIRES / comments

STRES RELIEF 343 C, 2 HRS

Le traitement thermique (TT) a été fait en utilisant des équipements en conformité avec AMS2759.

Le TT a été fait tel que requis par AMS2759 et toutes les vérifications et les tests demandés ont été faites et documentés. Aucun changement n'a été faite par rapport au TT. On certifie que le matériel a été fabriqué, échantillonné, testé et inspecté en accord avec AMS2759 et le bon de commande et le matériel rencontre les exigences spécifiées.

Heat treatment (HT) was performed with equipment that meets the requirements of AMS2759.

All HT operations were in compliance with AMS2759 and all verifications have been performed and documented. No unauthorized changes were performed in regards to the HT. We certify that the material was manufactured, sampled, tested and inspected in accordance with AMS2759 and the purchase order and was found to meet the requirements.

APPROUVÉ par / Approved by:

Isabel Otero

Isabel Otero

QA Technician



DATE: 2014-03-20

METCOR INC.

560 BOUL. ARTHUR-SAUVÉ
ST-EUSTACHE, QC J7R 5A8
Tel: 450-473-1884 / Fax: 450-491-5498

Reçu de livraison

Delivery Receipt

BON DE TRAVAIL Order	EXPÉDITEUR Shipper ID	BON D'EXPÉDITION Shipper
194281	1	79855

EXPÉDITION COMPLÈTE / Shipped Complete

CLIENT /Customer 215

DART AEROSPACE
1270 ABERDEEN
HAWKESBURY, ON K6A 1K7
Ph: 613-632-5200
Fax: 613-632-1053

LIVRÉ À /Shipped To

DART AEROSPACE
1270 ABERDEEN
HAWKESBURY, ON K6A 1K7
Ph: 613-632-5200
Fax: 613-632-1053

COMMANDE DU CLIENT Customer PO	BON DE LIVRAISON DU CLIENT Customer Shipper No.	TYPE DE MATÉRIEL Material Type	DATE DE LA COMMANDE Order Date	TRANSPORTEUR Carrier
23427		STEEL	2014/3/19	CLIENT

QUANTITÉ Quantity	No. PIÈCE / Part No.	NOM DE LA PIÈCE / Part Name	DESCRIPTION DE LA PIÈCE Part Description	POIDS Weight
----------------------	-------------------------	--------------------------------	---	-----------------

4 D350-748-101 120,
CROSSTUBE
(1) D350-748-101 CROSSTUBE 112354
(1) D350-748-201 / 110109
(1) D350-748-201 / 114192
(1) D350-748-201 / 114193

1 NIL

TYPE DE CONTENEUR Container Type	# DE CONTENEURS # Of Containers	COMMENTAIRES CONTENEUR Container Comments
NIL	1	

EMPAQUETAGE Packing	
-------------------------------	--

QUANTITÉ EXPÉDIÉE / Quantity Shipped : 4

POIDS EXPÉDIÉ / Weight Shipped : 120,00

QUANTITÉ RESTANTE / Quantity Remaining : 0

POIDS RESTANT / Weight Remaining : 0,00

QUANTITÉ EXPÉDIÉE /Quantity Shipped: 4

POIDS EXPÉDIÉ / Weight Shipped : 120,00

Signature:

Date:





Metcor Inc.

560, boul. Arthur Sauvé, St-Eustache (Québec) J7R 5A8

Tél. 450-473-1884

Boul. ARTHUR SAUVÉ, ST-EUSTACHE, QC, J7R 5A8

Télécopieur/Fax administration 450 491-5498

Télécopieur/Fax production 450 491-6454

Télécopieur / Fax administration: 450-491-5498

Télécopieur / Fax production: 450 491-6454

Rapport d'Inspection

Inspection Report

BON DE TRAVAIL

order

194281

CHARGE

CLIENT / customer 215

DART AEROSPACE

1270 ABERDEEN

HAWKESBURY

ON K8A 1K7

LIVRÉ À / shipped to:

DART AEROSPACE

1270 ABERDEEN

HAWKESBURY

ON K8A 1K7

COMMANDE DU CLIENT customer po	BON DE LIVRAISON DU CLIENT customer shipper no.	MATÉRIEL material	CODE DE TRAITEMENT mat'l heat code	NUMÉRO DE LOT lot number
23427		Steel		

SPECIFICATIONS DU PROCÉDÉ

processing specifications

STRESS REL

SAE AMS 2759/1 REV.E

EXIGENCE / requirement	SPECIFICATIONS / specified	TESTS EXÉCUTÉS / performed	RÉSULTATS DE TESTS / results
Visual			

QUANTITÉ quantity	POIDS weight	DESCRIPTION DES PIÈCES parts description
4	120	D350-748-101 CROSSTUBE (1) D350-748-101 CROSSTUBE 112354 (1) D350-748-201 / 110109 (1) D350-748-201 / 114182 (1) D350-748-201 / 114193 1 NIL

COMMENTAIRES / comments

APPROUVÉ par / Approved by:

DATE: 2014-04-10



Dart Aerospace Ltd.
1270 Aberdeen Street
Hawkesbury, ON K6A 1K7
Tel: 613 632 9577
Fax: 613 632 1053

PURCHASE ORDER

Purchase Order ID **PO23427**

Purchase Order Date 3/19/2014

PO Print Date 3/21/2014

Page Number 1 of 3

Order From :

VC-MET004

METCOR INC.
560 BOUL. ARTHUR SAUVE
SAINT-EUSTACHE, QC J7R 5A8
CA

Ship To : DART AEROSPACE LTD

1270 ABERDEEN
HAWKESBURY, ON K6A 1K7
CANADA

Contact Name

Vendor Phone 450 473 1884

Ship To Contact

Ship To Phone

Ship Via: VENDOR'S TRUCK

Ship Acct:

Buyer

Chantal Lavoie

Customer POID

Customer Tax #

10127-2607

Terms

Net 30

Currency

CAD

FOB

FCA - (Free Carrier)

Line Nbr	Reference Vendor Part Number Line Comments Delivery Comments	Description/ Mfg ID	Req Date/ Taxable Promise Date	CD	Req Qty/ Unit of Measure	PO Unit Price	Extended Price
1	112354	D350-748-101 CROSSTUBE	3/20/2014 Yes 3/20/2014		1.00 ✓	\$253.75	\$253.75
	HEAT TREAT CROSSTUBE AS PER QSI010 4.3 WITHIN 12H AFTER BENDING						
Line Total:							\$253.75
2	110109	D350-748-201 CROSSTUBE	3/20/2014 Yes 3/20/2014		1.00 ✓	\$253.75	\$253.75
	HEAT TREAT CROSSTUBE AS PER QSI010 4.3 WITHIN 12H AFTER BENDING						
Line Total:							\$253.75

SP14-3-21

Note:

3/21/2014

DQA:

Date: 14/06/24

WORK ORDER NON-CONFORMANCE / UPDATE



QA Closed:

Date: 14/5/16

Work Order update only ☐

Work Order: <u>110109</u>	DISPOSITION Rework <input type="checkbox"/> Scrap <input type="checkbox"/> Use-as-is <input checked="" type="checkbox"/> Suspected Unapproved <input type="checkbox"/>	AGAINST DEPARTMENT/PROCESS			
Part No. <u>D350-748-201</u>		Skid-tube <input type="checkbox"/>	Crosstube <input checked="" type="checkbox"/>	Water Jet <input type="checkbox"/>	Engineering <input type="checkbox"/>
NCR No. <u>14-3873</u>		Machining <input type="checkbox"/>	Small Fab <input type="checkbox"/>	Prod. Eng. Coord. <input type="checkbox"/>	Quality <input type="checkbox"/>
		Thermoforming <input type="checkbox"/>	Finishing <input type="checkbox"/>	Rec/Store/Packaging <input type="checkbox"/>	Other <input type="checkbox"/>
		Large Fab <input type="checkbox"/>	Composite <input type="checkbox"/>	Supplier <input type="checkbox"/>	

Root Cause	Date	Step	Qty	Description of work order update or non-conformance	Initial Chief Eng	Action Description	Sign & Date	Verification	QC Inspector
Design									
Doc/Data									
Equip/Tooling	14/3/25	110	1	Over all width is 0.18" under tolerance, after stress relief.	14/3/25	Acceptable.	14/3/25	14-03-26	14-3-25
Handling/Pre									
Material									
Operator									
Offset/Setup									
Process	<input checked="" type="checkbox"/>			21. Process / Bendy					
Supplier									
Training									
Transport									
Unapproved									

FAULT CATEGORY

Landing Gear <input checked="" type="checkbox"/> Bending <input type="checkbox"/> Centre Not Concentric <input type="checkbox"/> Cracks <input type="checkbox"/> Crimp/Kink/Ripple/Wave <input type="checkbox"/> Cuffs <input type="checkbox"/> Crushing <input type="checkbox"/> Heat Treat <input type="checkbox"/> Inspection Strip in Tube <input type="checkbox"/> Marks/Chatter <input type="checkbox"/> Turning Sequence <input type="checkbox"/> Wave/Twist in Tube	General <input type="checkbox"/> Bend <input type="checkbox"/> BOM/Route <input type="checkbox"/> Broken/Damage/Defect <input type="checkbox"/> Burrs <input type="checkbox"/> Contamination <input type="checkbox"/> Countersink <input type="checkbox"/> Cut Too Short <input type="checkbox"/> Drawing <input type="checkbox"/> Drill Holes <input type="checkbox"/> Finish <input type="checkbox"/> Fit/Function	<input type="checkbox"/> Folio/Program <input type="checkbox"/> Grain <input type="checkbox"/> Hardware <input type="checkbox"/> Inspection Incomplete/Unqualified <input type="checkbox"/> Instructions Incomplete/Unclear <input type="checkbox"/> Misaligned/off center <input type="checkbox"/> Mislabeled <input type="checkbox"/> Misread <input type="checkbox"/> Off-set <input type="checkbox"/> Out of Calibration <input type="checkbox"/> Out of Sequence	<input type="checkbox"/> Outside Dimensions <input type="checkbox"/> Over/Under tolerance <input type="checkbox"/> Part Incorrect <input type="checkbox"/> Part Lost/Missing <input type="checkbox"/> Part Moved <input type="checkbox"/> Positioned Wrong <input type="checkbox"/> Power Loss/Surge	<input type="checkbox"/> Pressure/Forced <input type="checkbox"/> Set-up <input type="checkbox"/> Temperature/Cure <input type="checkbox"/> Weld <input type="checkbox"/> Wrong Stock Pulled <input type="checkbox"/> Other
---	--	---	--	--

258

3.4

1941

1941

NCR: Yes / No

WORK ORDER NON-CONFORMANCE / UPDATE

DQA: dd Date: 14/06/03QA Closed: AL Date: 14/5/10

Work Order: <u>110109</u>	DISPOSITION Rework <input type="checkbox"/> Scrap <input type="checkbox"/> Use-as-is <input checked="" type="checkbox"/> Work Order Update <input type="checkbox"/>	AGAINST DEPARTMENT/PROCESS			
Part No. <u>D350-748-201</u>		Skid-tube <input type="checkbox"/> Machining <input type="checkbox"/> Thermoforming <input type="checkbox"/> Large Fab <input type="checkbox"/>	Crosstube <input type="checkbox"/> Small Fab <input type="checkbox"/> Finishing <input type="checkbox"/> Composite <input type="checkbox"/>	Water Jet <input type="checkbox"/> Prod. Eng. Coord. <input type="checkbox"/> Rec/Store/Packaging <input type="checkbox"/> Supplier <input type="checkbox"/>	Engineering <input type="checkbox"/> Quality <input type="checkbox"/> Other <input type="checkbox"/>
NCR No. <u>14-3873</u>					

Root Cause	Date	Step	Qty	Description of work order update or Non-conformance	Initial Chief Eng	Action Description	Sign & Date	Verification	QC Inspector
Doc/Data <input type="checkbox"/>	<u>14/3/25</u>	<u>110</u>	<u>1</u>	<u>Angle is over tolerance after bonding</u>	<u>UP</u> <u>14/3/25</u>	<u>Acceptable</u>	<u>UP</u> <u>14/3/25</u>	<u>JTW</u> <u>14-03-25</u>	<u>14-3-25</u> <u>9.03 DAS</u>
Equip/Tooling <input type="checkbox"/>									
Operator <input type="checkbox"/>									
Material <input type="checkbox"/>									
Setup <input type="checkbox"/>									
Other <input type="checkbox"/>									
Process <input type="checkbox"/>									
Supplier <input type="checkbox"/>									
Training <input type="checkbox"/>									
Unapproved <input type="checkbox"/>									

FAULT CATEGORY

Landing Gear	General	
<input type="checkbox"/> Bending	<input type="checkbox"/> Bend	<input type="checkbox"/> Grain
<input type="checkbox"/> Centre Not Concentric to O/S	<input type="checkbox"/> BOM/Route	<input type="checkbox"/> Hardware
<input type="checkbox"/> Cracks	<input type="checkbox"/> Broken/Damaged	<input type="checkbox"/> Inspection Incomplete
<input type="checkbox"/> Crushed/Crimped	<input type="checkbox"/> Burrs	<input type="checkbox"/> Instructions Incomplete/Unclear
<input type="checkbox"/> Cuffs	<input type="checkbox"/> Contamination	<input type="checkbox"/> Maintenance
<input type="checkbox"/> Heat Treat	<input type="checkbox"/> Countersink	<input type="checkbox"/> Misabeled
<input type="checkbox"/> Inspection Strip in Tube	<input type="checkbox"/> Cut Too Short	<input type="checkbox"/> Misread
<input type="checkbox"/> Ripples in Bend	<input type="checkbox"/> Drill Holes	<input type="checkbox"/> Offset
<input type="checkbox"/> Torque Waves in Extrusion	<input type="checkbox"/> Drawing	<input type="checkbox"/> Out of Calibration
<input type="checkbox"/> Turning Sequence	<input type="checkbox"/> Finish	<input type="checkbox"/> Out of Sequence
<input type="checkbox"/> Wave/Twist in Tube	<input type="checkbox"/> Folio	<input type="checkbox"/> Outside Dimensions
		<input type="checkbox"/> Ovalized
		<input type="checkbox"/> Over/Under tolerance
		<input type="checkbox"/> Part Incorrect
		<input type="checkbox"/> Part Lost/Missing
		<input type="checkbox"/> Part Moved
		<input type="checkbox"/> Positioned Wrong
		<input type="checkbox"/> Power Loss/Surge
		<input type="checkbox"/> Pressure/Forced
		<input type="checkbox"/> Temperature/Cure
		<input type="checkbox"/> Weld
		<input type="checkbox"/> Wrong Stock Pulled
		<input type="checkbox"/> Other

**CERTIFICATE OF
CONFORMANCE**

**CADORATH PLATING CO. LTD.
2150 LOGAN AVENUE
WINNIPEG, MANITOBA R2J-0J1**

DATE: May-05-2014

CONSIGNED TO: Dart Aerospace Ltd.
1270 Aberdeen St.
Hawksbury, ON K6A 1K7

W/O #: 134850
INVOICE #: 70988

**CONTRACT OR
PURCHASE ORDER #** PO23597

DESCRIPTION: CROSSTUBE

QTY 1

P/N # D350-748-201

S/N # 110109

MPI IAW ASTM-E-1444. CADMIUM PLATING IAW AMS-QQ-P-416C
TYPE 2 YELLOW CLASS 1. FINAL MPI IAW ASTM-E-1444. BAKE
HEAT CHART # 14-375 AND 14-449.

Sidley

CERTIFICATE: I certify that the items indicated here on have
been inspected and tested and conform to all specifications
and requirements detailed on the contract or purchase order.

Approved Inspector:





skyservice
Air travel. Evolved.

NDT Work Order

Sky Service F.B.O. Inc.

DOT APP 53-89 / EASA 145.7142 / BDA AMO 385

WO #: YYZ

70270

Customer:

DART AEROSPACE Dept: NDT YYZ

Reference:

24178

Make:

Model:

Reg:

A/C S/N:

TSN:

CSN:

TSO:

Tail#:

Task: ☐ Scheduled ☐ Unscheduled ☐ A.O.G. ☒ P.T. ☐ M.T. ☐ E.T. ☐ U.T. ☐ R.T.

Work Required:

CARRY OUT NDT ON THE FOLLOWING D350-748-201 AFT CROSSSTUBES:

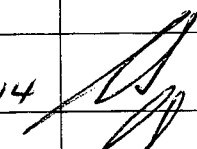

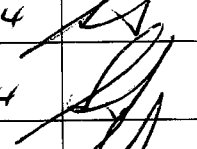

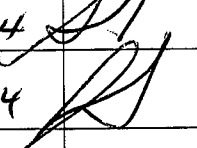

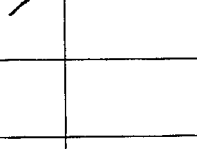

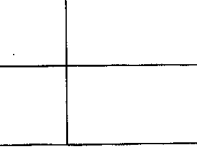

① WORK ORDER ID 110109

② WORK ORDER ID - 106689

③ WORK ORDER ID - 106690

④ WORK ORDER ID - 114192

⑤ WORK ORDER ID - 114193

Action Taken:	Date:	Initial/Stamp:
LIQUID PENETRANT INSPECTION CARRIED OUT IAW ASTM 1417-M13 ON:		
① WO ID - 110109 = NO CRACKS FOUND	12 MAY 2014	 
② WO ID - 106689 = NO CRACKS FOUND	12 MAY 2014	 
③ WO ID - 106690 = NO CRACKS FOUND	12 MAY 2014	 
④ WO ID - 114192 = NO CRACKS FOUND	12 MAY 2014	 
⑤ WO ID - 114193 = NO CRACKS FOUND	12 MAY 2014	 
PENETRANT - ARDAX 970P25E BATCH # 02312131		
BLACK LIGHT - M2089		

I certified that the maintenance described above has been performed with the applicable standard of airworthiness.

Signature:

ACA/SCA Stamp

Date:

Name:

GARY SMITH



12 MAY
2014